

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

1 Claims 1-2 (canceled):

1 Claim 3 (currently amended): ~~The method of claim 2,~~ A packet flow control method
2 comprising the steps of:
3 detecting congestion in a first node along a packet flow path between a
4 source device and a destination device;
5 identifying a node in said path preceding said first node, wherein said step
6 of identifying a node in said path includes the step of: transmitting a signal to said
7 destination device requesting path information; and
8 transmitting to said preceding node a traffic regulation signal used to
9 initiate flow rate control on flows identified from information included in said traffic
10 regulation signal, wherein said information included in said traffic regulation signal
11 includes a destination address.

1 Claim 4 (currently amended): ~~The method of claim 2,~~ A packet flow control method
2 comprising the steps of:
3 detecting congestion in a first node along a packet flow path between a
4 source device and a destination device, ~~wherein the step of detecting congestion at a first~~
5 ~~node includes~~ including the steps of: monitoring to detect when said first node is
6 saturated with packet traffic for a preselected period of time;
7 identifying a node in said path preceding said first node, and
8 transmitting to said preceding node a traffic regulation signal used to
9 initiate flow rate control on flows identified from information included in said traffic
10 regulation signal, wherein said information included in said traffic regulation signal
11 includes a destination address.

1 Claim 5 (original): The method of claim 4, wherein said traffic regulation signal further
2 includes packet flow path information.

1 Claim 6 (currently amended): The method of claim 5, further comprising the steps of:
2 operating said preceding network node to transmit an additional traffic
3 regulation signal to an additional preceding node to cause the additional preceding node
4 to initiate flow rate control on flows directed to a destination address identified in said
5 additional traffic regulation signal.

1 Claim 7 (canceled):

1 Claim 8 (currently amended): ~~The method of claim 7, further comprising:~~ A packet flow
2 control method comprising the steps of:

3 detecting congestion in a first node along a packet flow path between a
4 source device and a destination device;

5 operating the first node to perform a forced reduction in the flow rate of at
6 least one packet flow in response to detecting traffic congestion;

7 identifying a node in said path preceding said first node,

8 transmitting to said preceding node a traffic regulation signal used to
9 initiate flow rate control on flows identified from information included in said traffic
10 regulation signal, and

11 operating said preceding node to perform a forced reduction in the flow
12 rate of at least one packet flow in response to detecting traffic congestion.

1 Claim 9 (currently amended): The method of claim 8,
2 wherein the forced reduction in the flow rate performed in the first node is performed as a
3 function of a base line flow rate for traffic flowing through the first node; and
4 wherein the forced reduction in the flow rate performed in the preceding network node is
5 performed as a function of a base line flow rate for traffic flowing through the preceding
6 network node.

1 Claim 10 (original): A method of implementing flow control in a communications
2 network including a first node, a second node and a destination node, the first node being
3 located upstream of the second node on a communications path to said destination device,
4 the method comprising the steps of:

5 operating the second node to detect when the second node is saturated
6 with traffic for a period of time;

7 in response to detecting that said second node is saturated with traffic for
8 said period of time, operating the second node to send a first traffic regulation signal to
9 the first node to trigger said first node to perform traffic regulation of flow rates on flows
10 of packets directed to said destination device.

1 Claim 11 (original): The method of claim 10 wherein, in response to detecting that said
2 second node is saturated with traffic for said period of time, said second node performs
3 the step of:

4 initiating a path determination operation to determine at least a portion of
5 a path of a flow causing congestion at said second node.

1 Claim 12 (original): The method of claim 11, further comprising:

2 operating said second node to receive path information identifying said
3 first node as part of said path of the flow causing congestion.

1 Claim 13 (original): The method of claim 12, further comprising:

2 operating the second node to detect when the second node ceases to be
3 saturated with traffic after being saturated for said period of time;

4 in response to the second node detecting that has ceased to be saturated
5 with traffic, sending a second traffic regulation message to said first node to cause said
6 first node to cease traffic regulation of flow rates on flows of packets directed to said
7 destination device.

1 Claim 14 (original): The method of claim 12, further comprising:

2 operating the first node, in response to said first traffic regulation message,
3 to perform forced flow rate reduction operations on at least some flows directed to said
4 destination node.

1 Claim 15 (original): The method of claim 14, further comprising:

2 operating the first node to transmit a third traffic regulation message to a
3 node located upstream of said first node in said path of the flow causing the congestion to
4 trigger flow control operations in said node located upstream of said first node.

1 Claim 16 (original): The method of claim 14, wherein operating the first node to perform
2 forced flow rate reduction operations includes:

3 comparing packet flow rates of packet flows directed to said destination to
4 at least one flow rate baseline for said first node; and

5 dropping packets from packet flows directed to said destination which
6 have flow rates exceeding the flow rate base line to which the particular flow rate is
7 compared.

1 Claim 17 (original): The method of claim 16, further comprising, in said first node,
2 distinguishing, for traffic flow control purposes, between packet flows
3 corresponding to protocol types which are responsive to congestion control signals and
4 packet flows corresponding to protocol types which are not responsive to congestion
5 control signals.

1 Claim 18 (currently amended): A communications system for communicating
2 information as flows of packets, the system comprising:

3 a first network node including:

4 i. congestion control means for detecting congestion at said
5 first network node;

6 ii. traffic flow path determination means for determining
7 the path of at least one packet flow causing congestion at said first
8 network node; and

9 iii. early traffic regulation signaling means for transmitting
10 a traffic regulation signal to initiate traffic regulation at an upstream
11 network node; and
12 an upstream network node, the upstream network node being coupled to
13 the first network node, the upstream network node including:
14 i. means for receiving traffic regulation signals from said first
15 network node; and
16 ii. flow control means for performing flow rate reduction
17 operations on one or more traffic flows identified from information
18 included in received traffic flow control messages.

1 Claim 19 (original): The communication system of claim 18, further comprising:
2 a destination node coupled to said first network node for serving as the destination
3 of at least some of the packet flows passing through the first network node, the
4 destination node including:
5 means for reconstructing packet flow paths from received information;
6 and
7 means for transmitting reconstructed packet flow path information to the
8 first network node in response to a request for path information from said traffic flow
9 path determination means.

1 Claim 20 (original): The communication system of claim 19, wherein the traffic
2 regulation signal generated by the early traffic regulation signaling means of the first
3 network node includes a destination address corresponding to said destination node.

1 Claim 21 (original): The communication system of claim 20,
2 wherein the first network node includes traffic flow rate baselines
3 generated from traffic flowing through the first network node over a period of time; and
4 wherein the upstream network node includes traffic flow rate baselines generated from
5 traffic flowing through the upstream network node over a period of time.

1 Claim 22 (original): The communication system of claim 21,
2 wherein the first network node further comprises flow control means for
3 performing a flow control operation including the dropping of packets from at least one
4 packet flow as a function of at least one of the first network node traffic flow rate
5 baselines.

1 Claim 23 (original): The communication system of claim 22, wherein the first network
2 node further comprises:
3 a plurality of packet queues, one packet queue being used to store packets
4 corresponding to a single or each group of flows to which are to be subject to different
5 flow rate reduction operations are part of the processing by said flow control means.